

Method and system for presentation and specification of distributed multi-customer
configuration management within a network management framework

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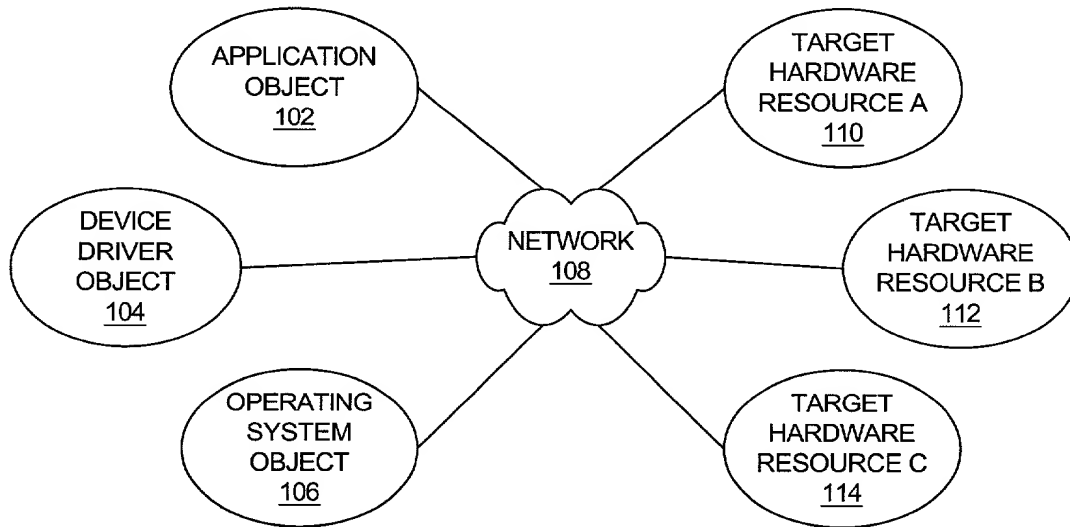


FIG. 1
(PRIOR ART)

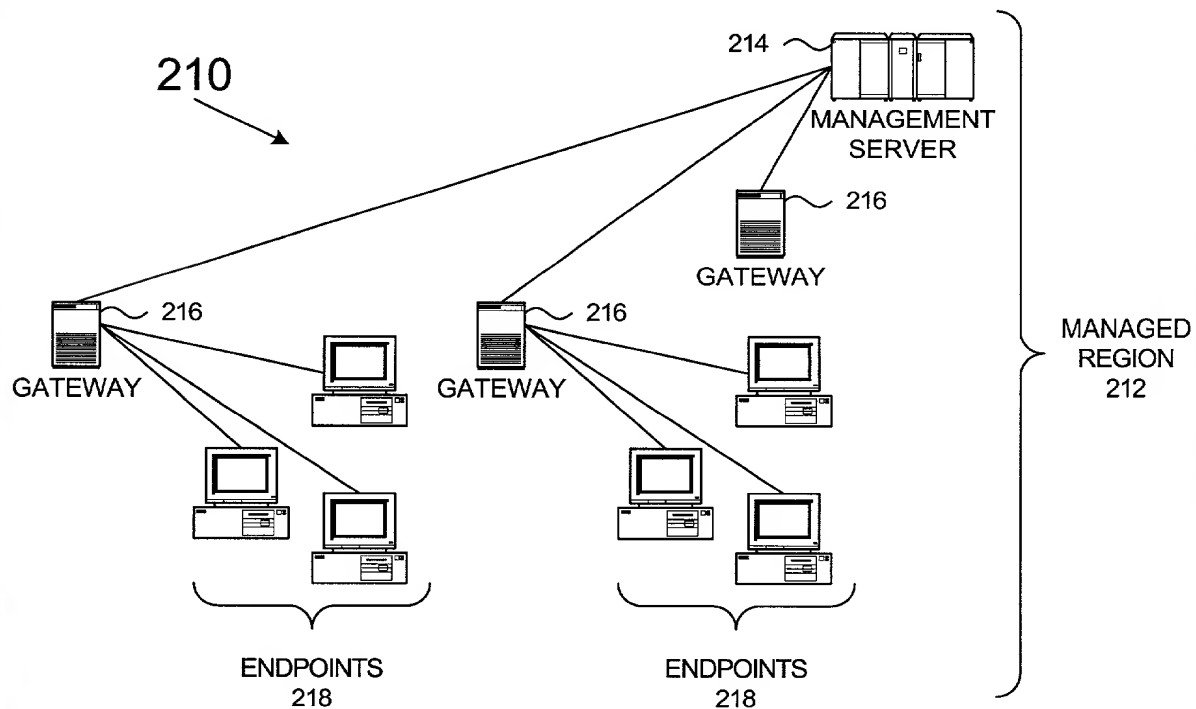


FIG. 2A

Method and system for presentation and specification of distributed multi-customer configuration management within a network management framework

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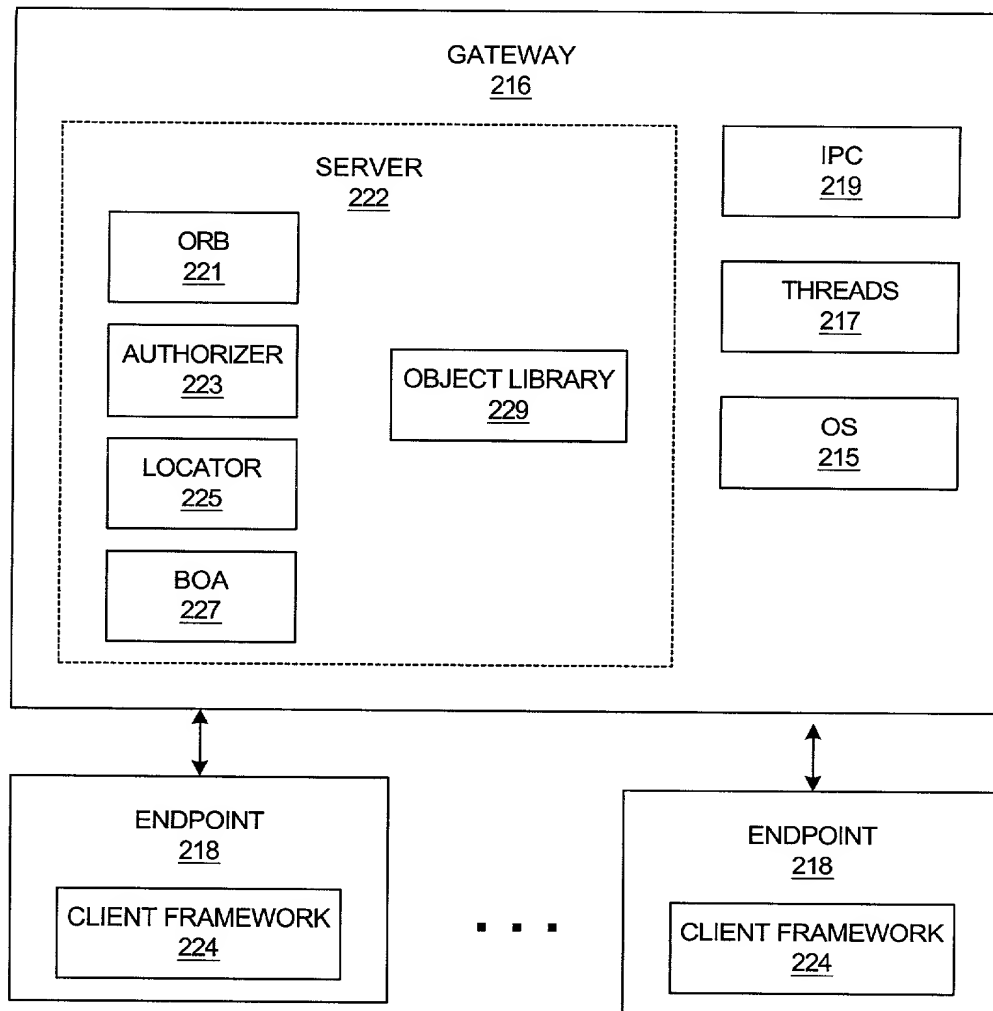


FIG. 2B

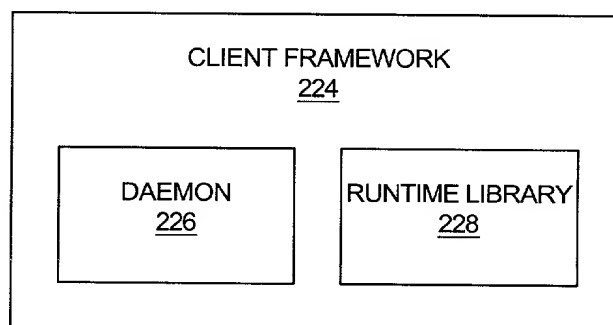


FIG. 2C

Method and system for presentation and specification of distributed multi-customer
configuration management within a network management framework

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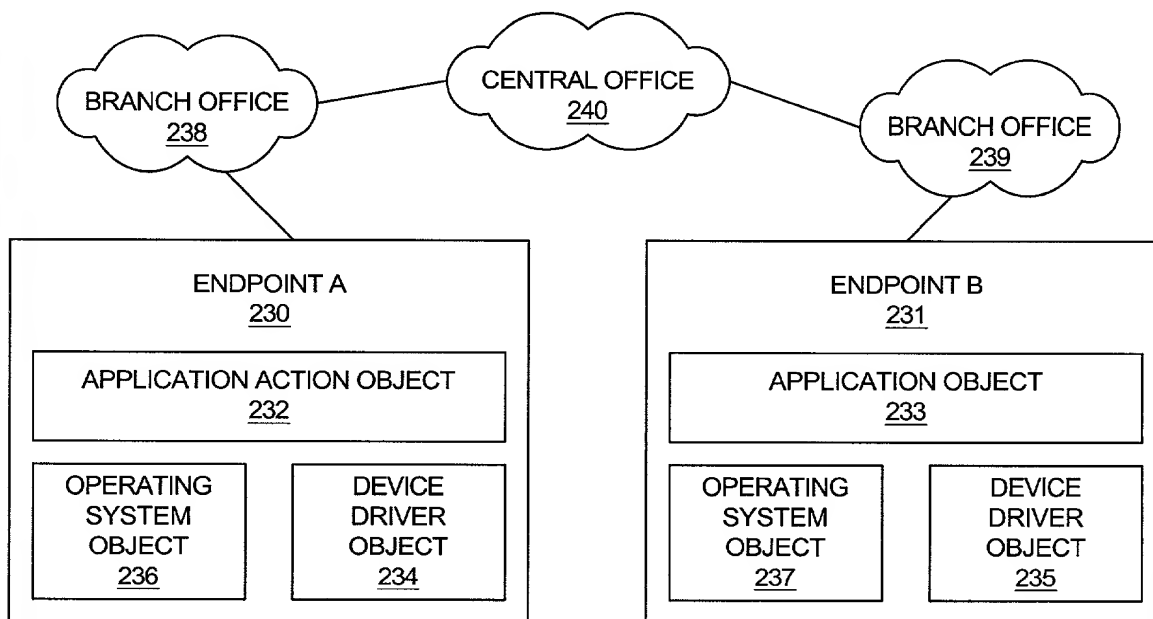


FIG. 2D

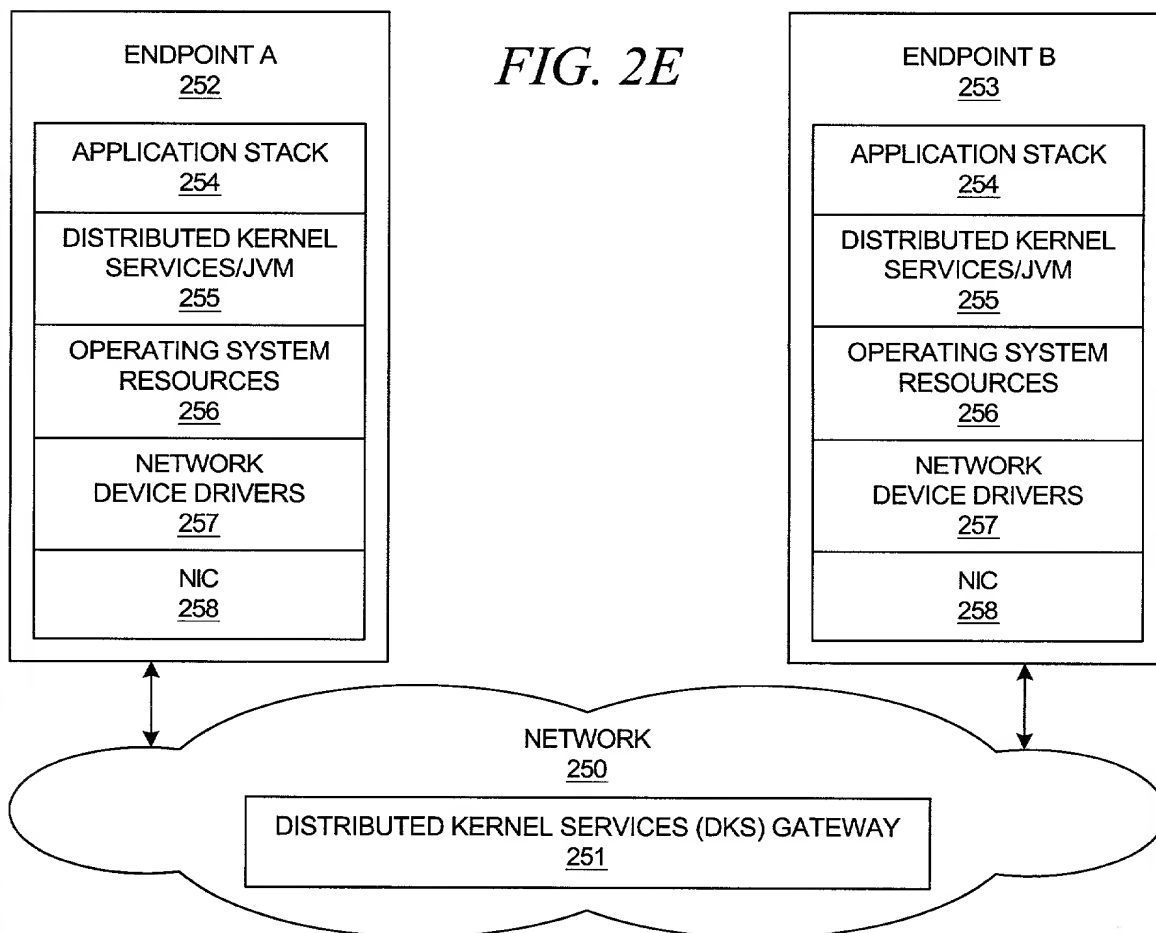


FIG. 2E

Method and system for presentation and specification of distributed multi-customer configuration management within a network management framework

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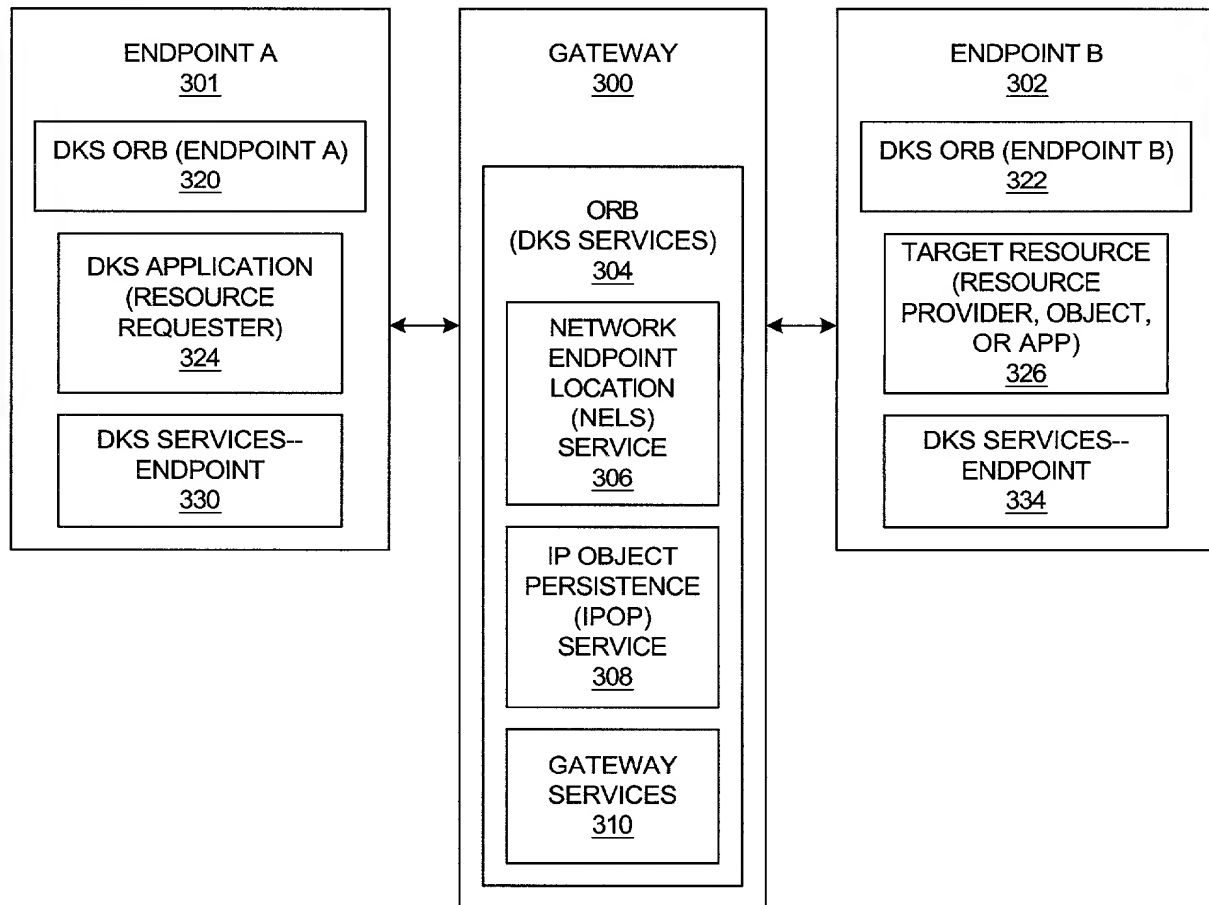


FIG. 3

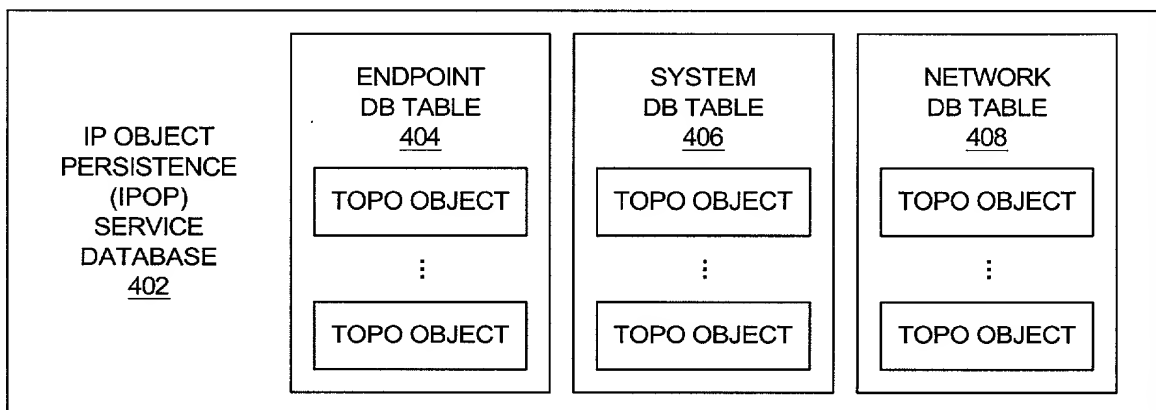
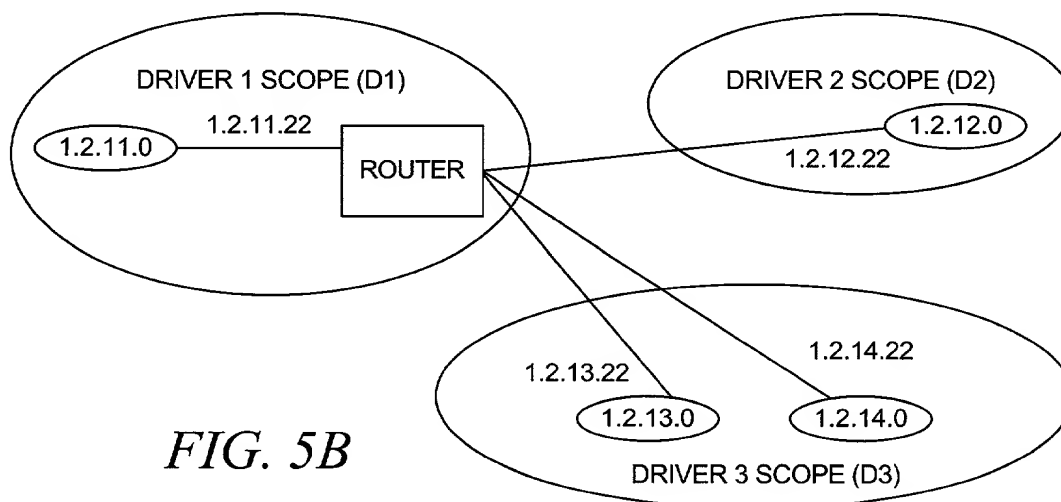
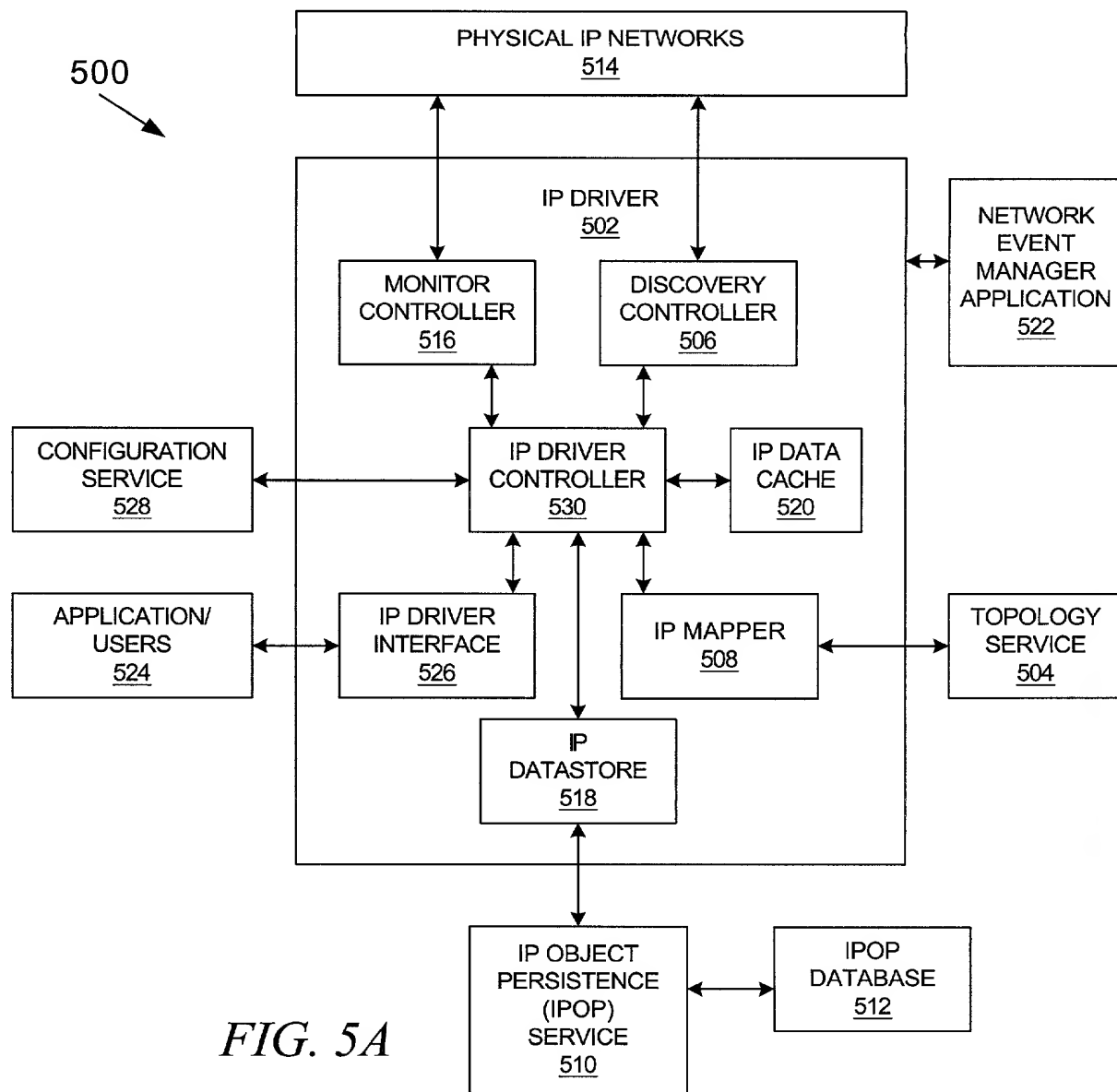


FIG. 4

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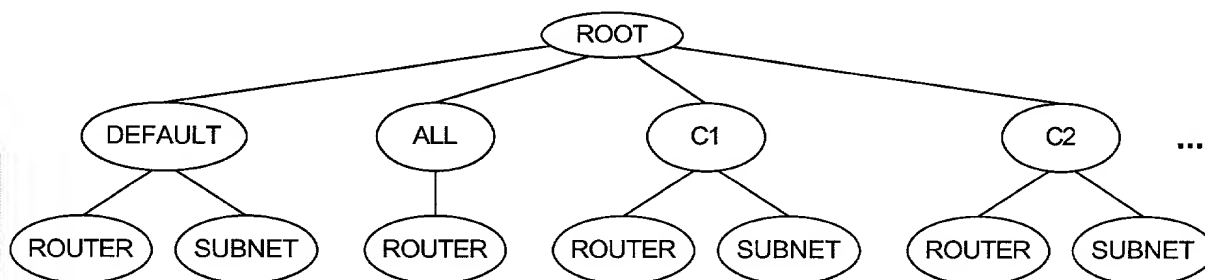


FIG. 5C

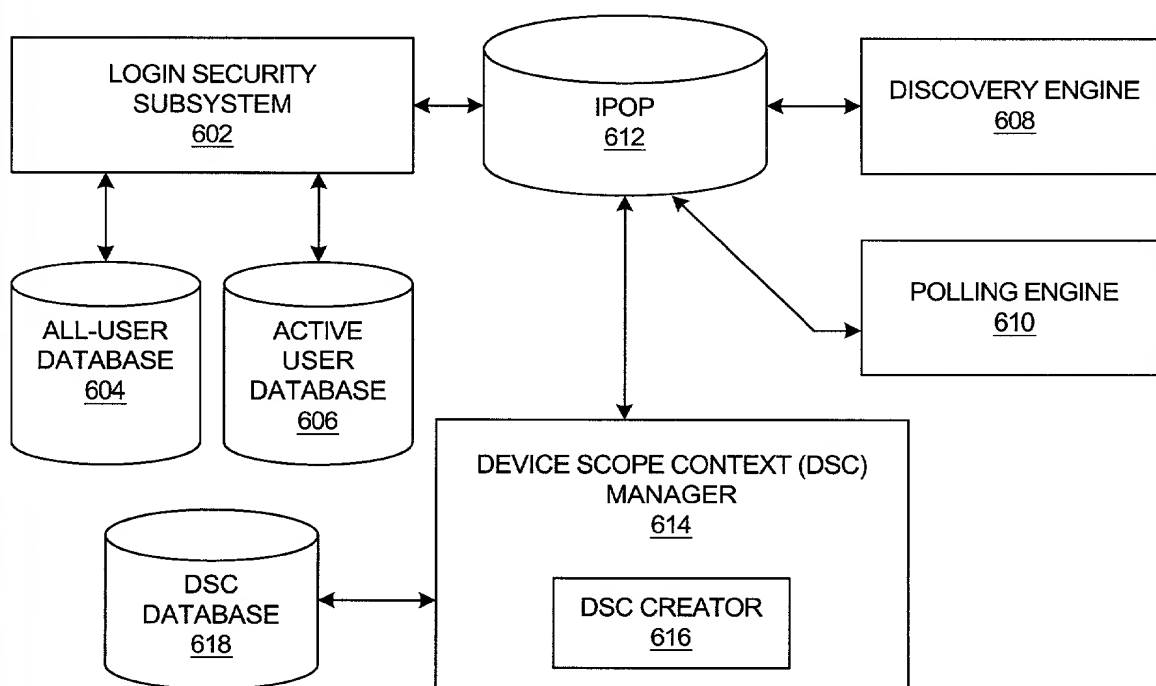


FIG. 6

[illegible]

Method and system for presentation and specification of distributed multi-customer configuration management within a network management framework

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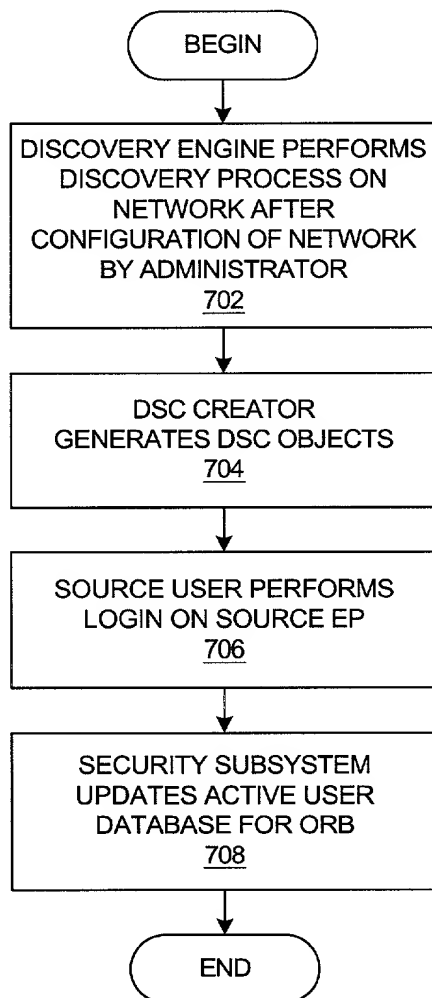


FIG. 7A

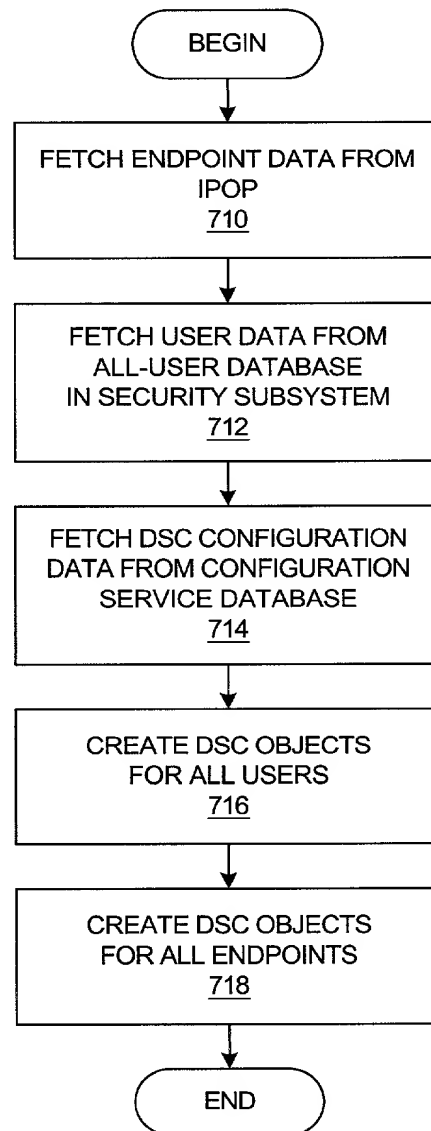


FIG. 7B

Method and system for presentation and specification of distributed multi-customer configuration management within a network management framework

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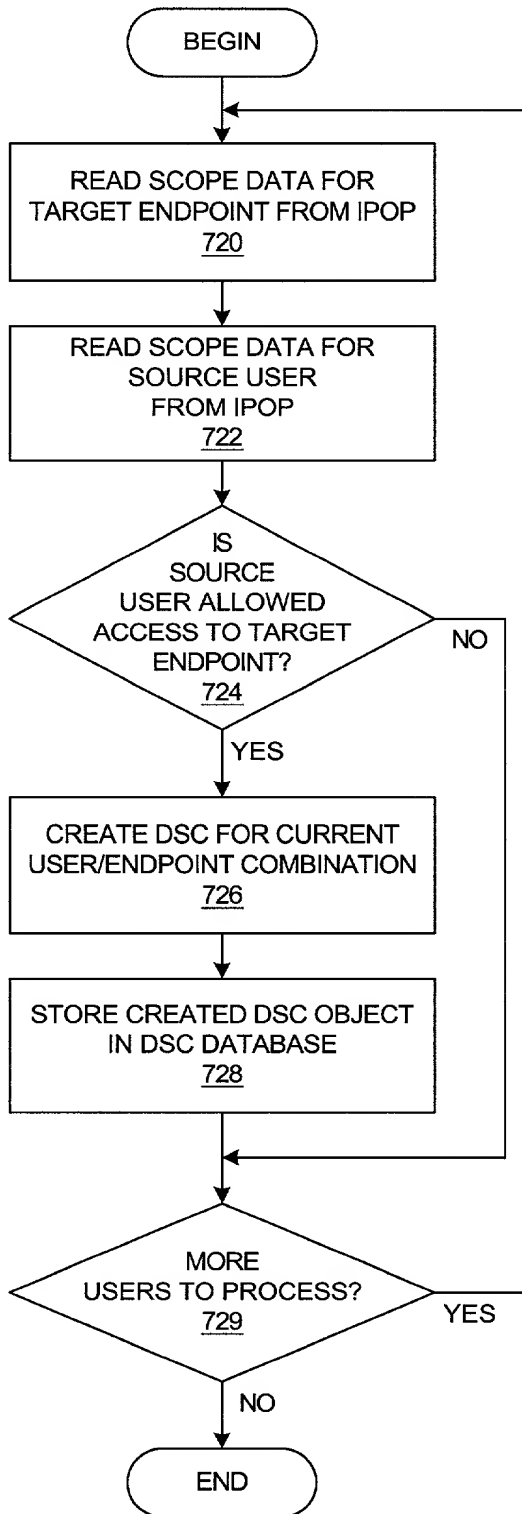


FIG. 7C

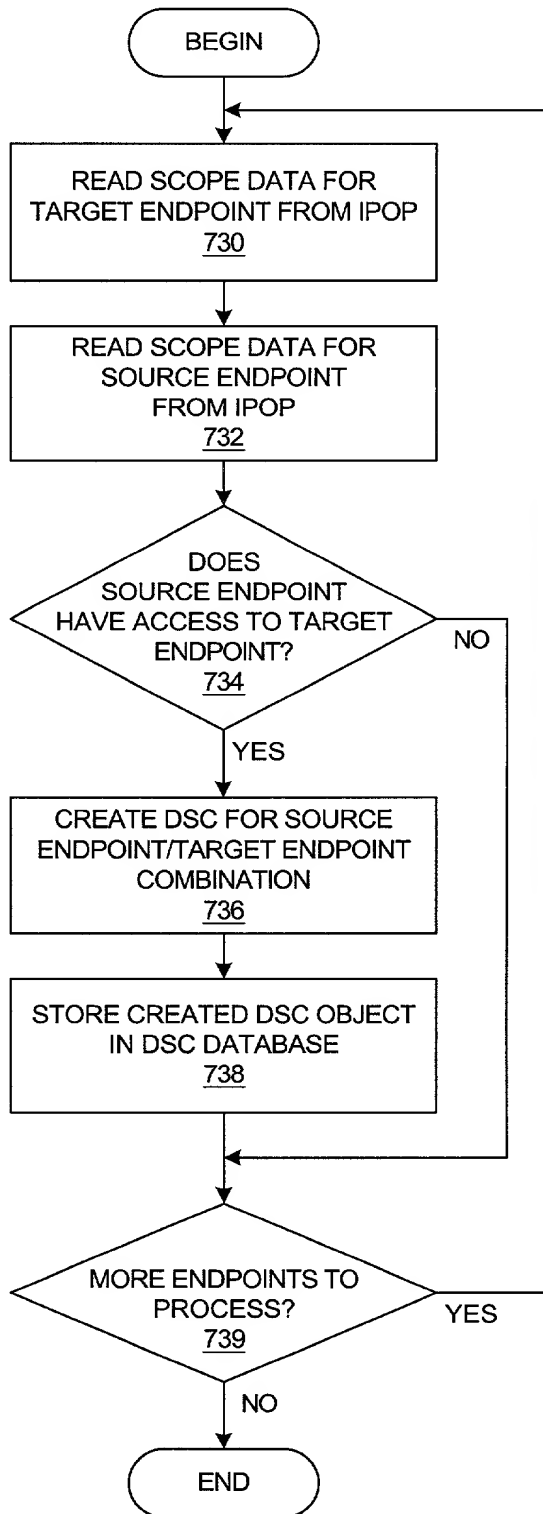


FIG. 7D

FIG. 7C

Method and system for presentation and specification of distributed multi-customer configuration management within a network management framework

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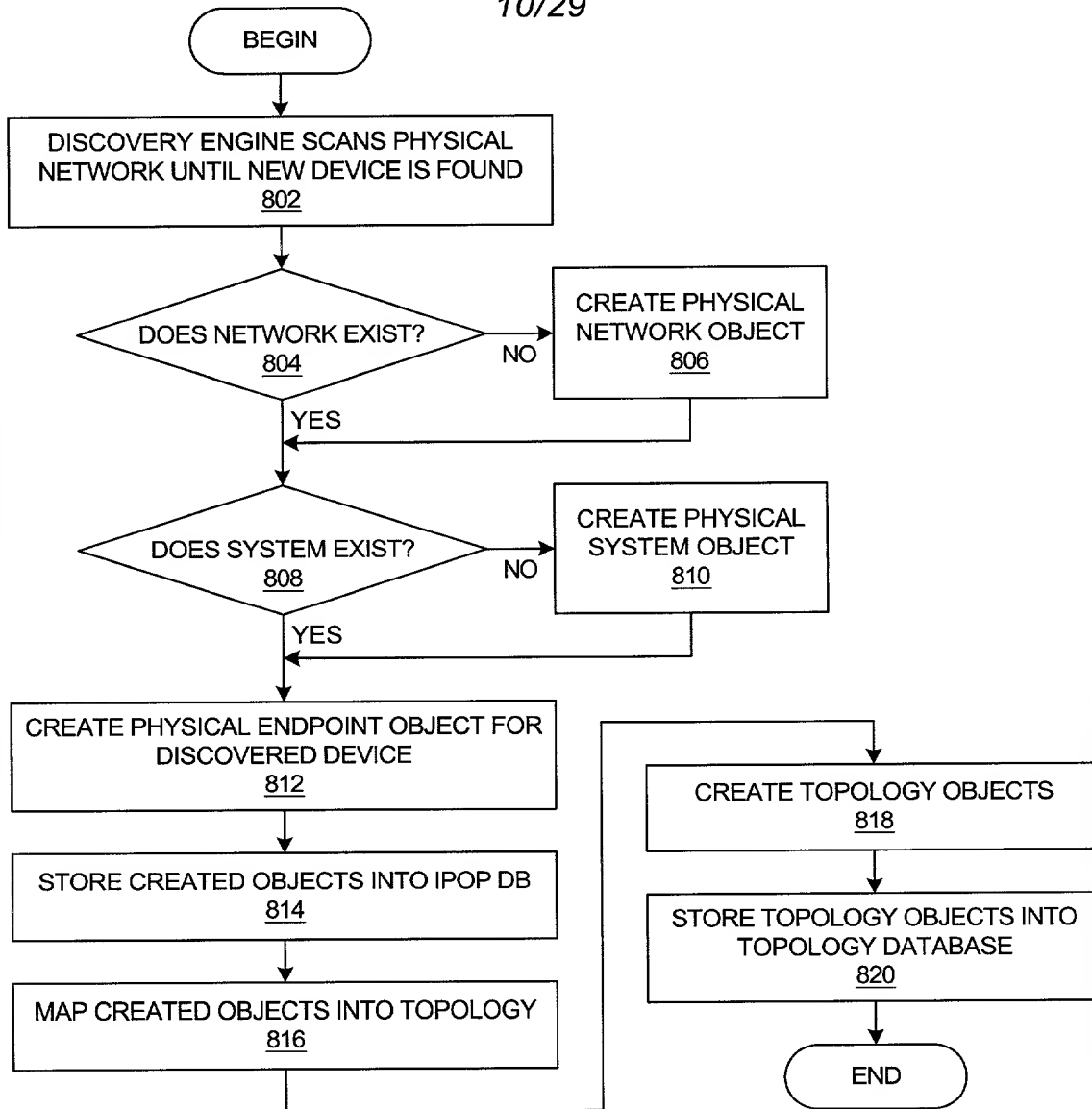


FIG. 8A

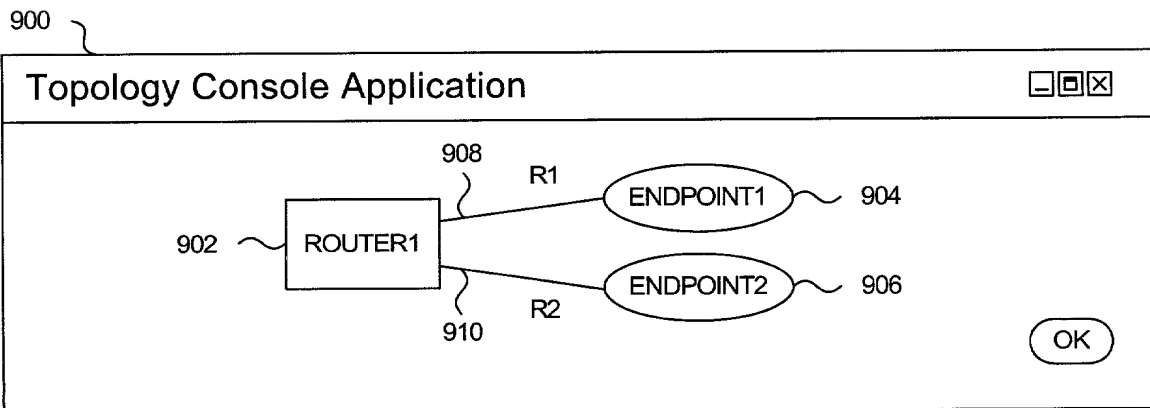


FIG. 9A

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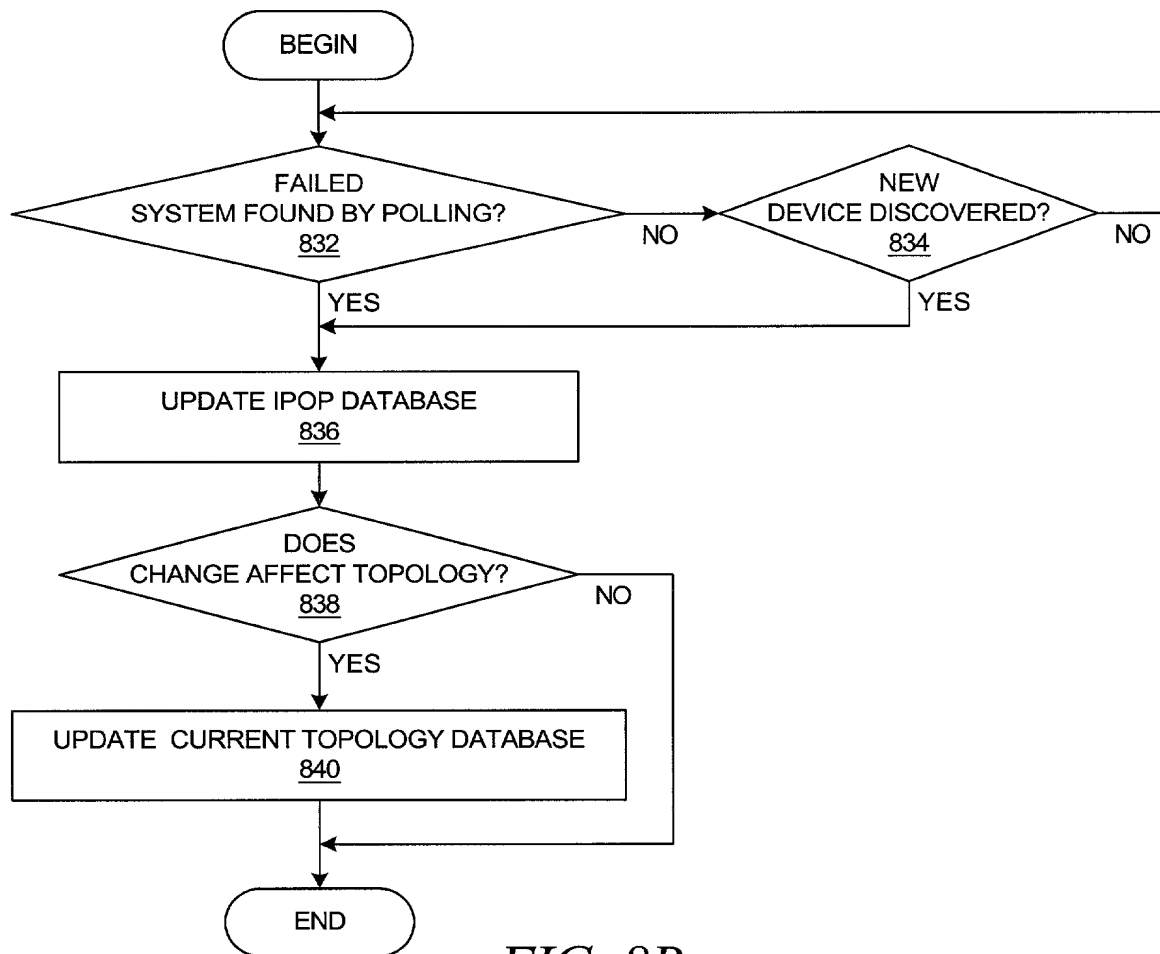


FIG. 8B

930

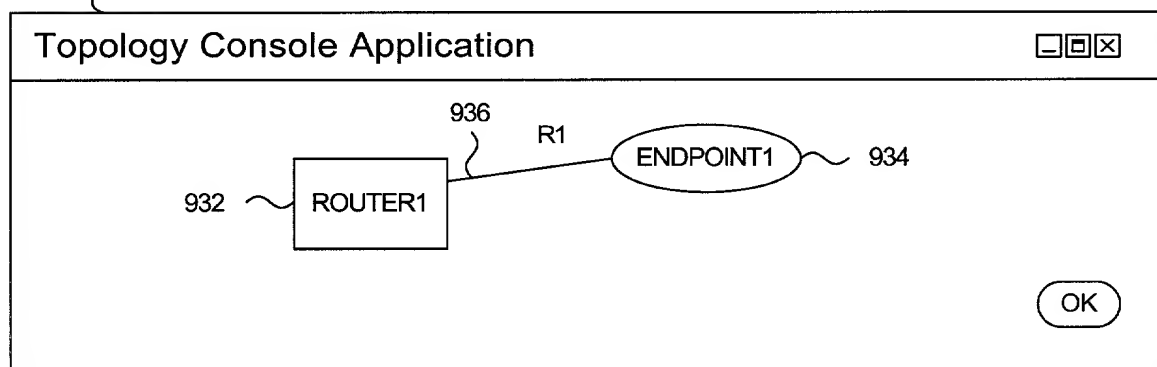


FIG. 9B

Method and system for presentation and specification of distributed multi-customer configuration management within a network management framework

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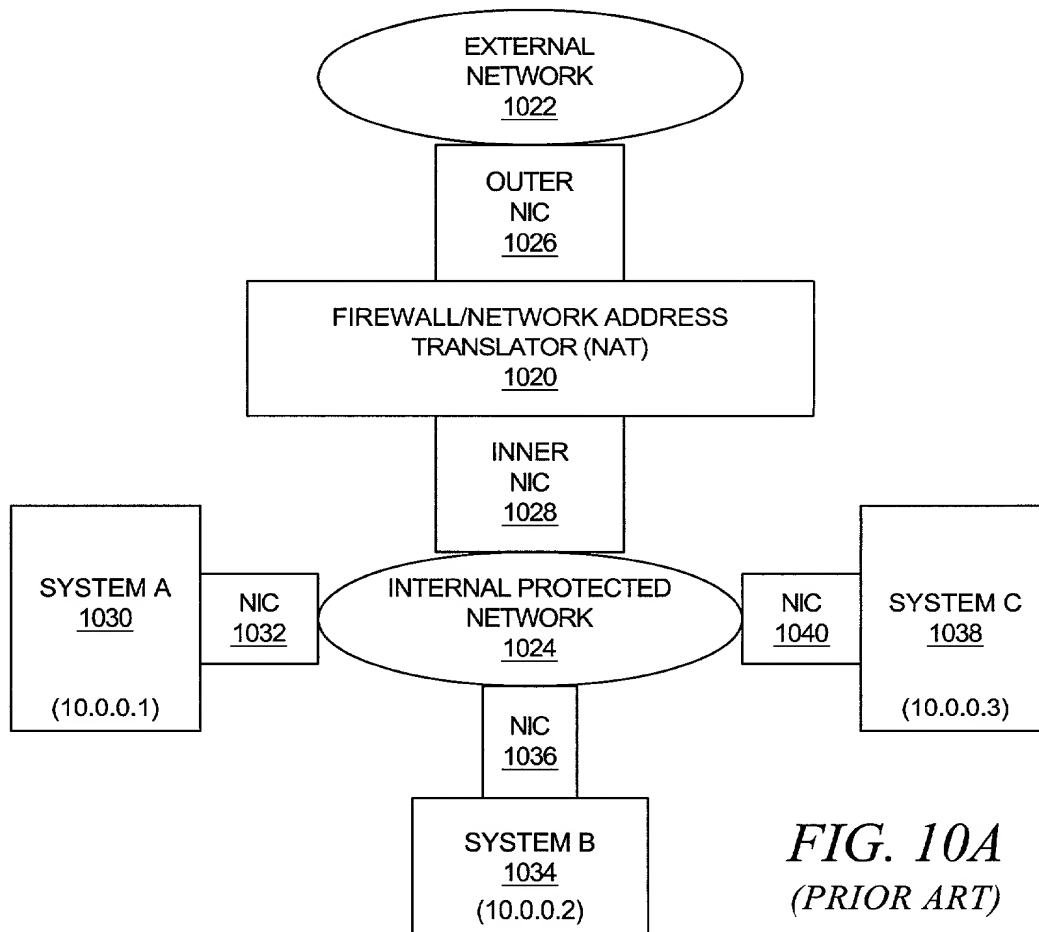


FIG. 10A
(PRIOR ART)

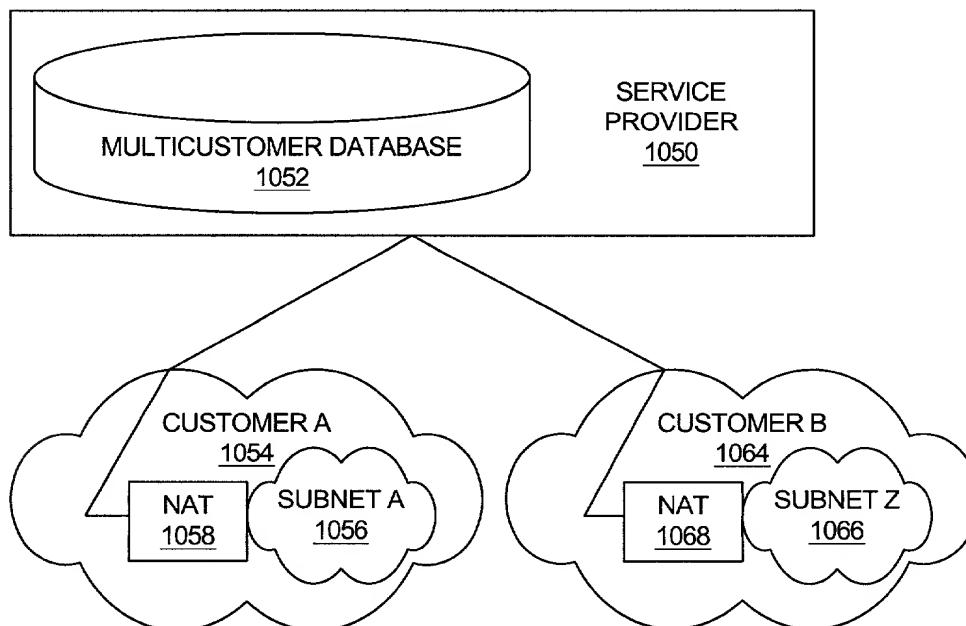


FIG. 10B

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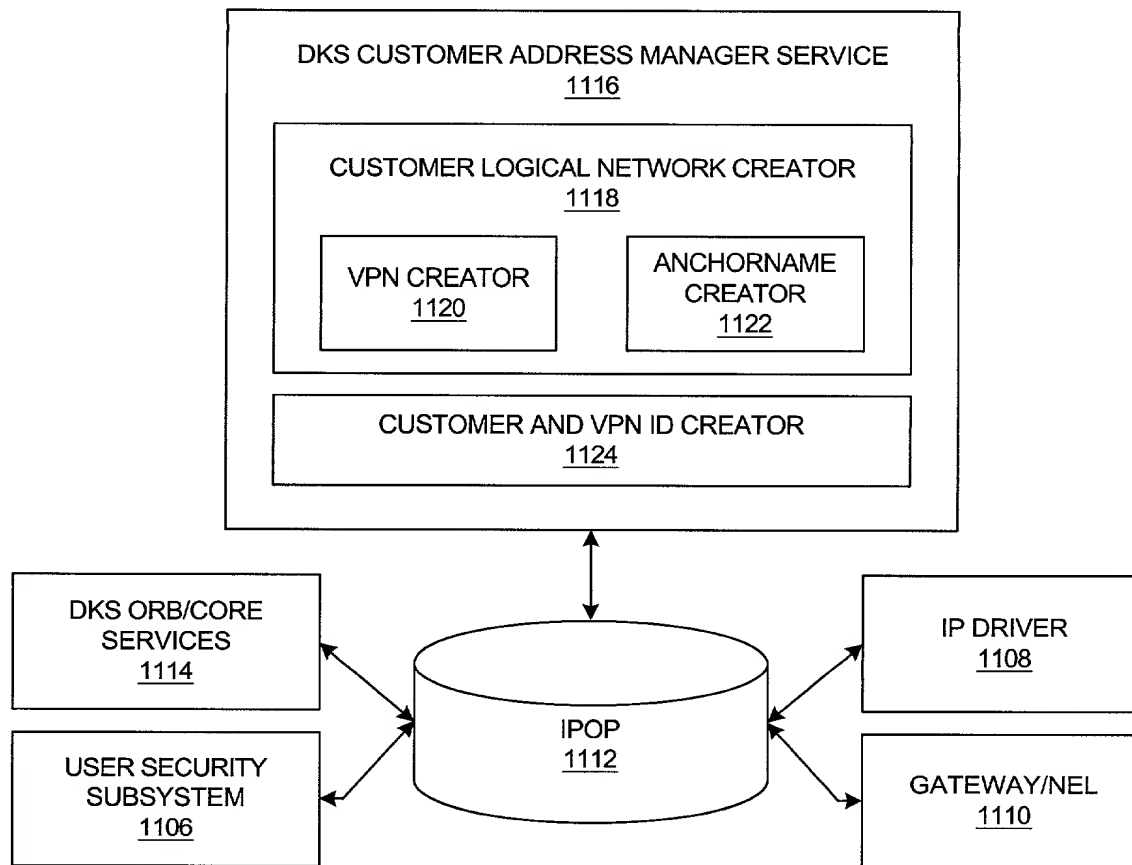


FIG. 11A

1350

Network Management Application

NETWORKS REQUIRING VPN CREATION-DUPLICATE ADDRESSES EXIST

PHYSICAL NETWORK ADDRESS: 10.7.205.103 ~ 1352
CUSTOMER ANCHORNAME: AUSTIN\BLDG1 ~ 1356
VPN ID: ~ 1370

PHYSICAL NETWORK ADDRESS: 10.7.205.103 ~ 1354
CUSTOMER ANCHORNAME: AUSTIN\BLDG2 ~ 1358
VPN ID: ~ 1372

1378 ☒ CHANGE VPN ID FOR ENTIRE SCOPE

SET ~ 1374
1376 ~ CLEAR

FIG. 13

Method and system for presentation and specification of distributed multi-customer configuration management within a network management framework

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```

Public Class IPActionObject {

    Endpoint sourceEP;
    Endpoint targetEP;

    // CONSTRUCTOR
    IPActionObject( Endpoint targetEP, Endpoint sourceEP ) {
        .
        .
        .
    }
    VOID performAction( ) // EXECUTES ACTION METHOD
    .
    .
    .
}

```

FIG. 11B

```

Public Class Endpoint {

    // public variables
    long   EObjectID; // ID to object (both private and public network addresses)
    InetAddress EIPAddress; // physical network address (private or public)
    long   EPVPN; // virtual private network ID

    //get/set of variables
    public long      getObjectID( ) { ... }
    public InetAddress getAddress( ) { ... }
    public long      getVPN( ) { ... }

}

```

FIG. 11C

```

Public Class EndpointCustomer extends Endpoint {

    public getVPNGW( ) {
        //gets the only gateway which has access to a particular private network
        .
        .
        .
    }
    //private variables only set/accessed by EP creator IPOP
    long   customerHashNumber;
    String customerName;
    String customerAnchorPath;
    Long   objectIDPrivateGatewayRoute

}

```

FIG. 11D

T06230-48659960

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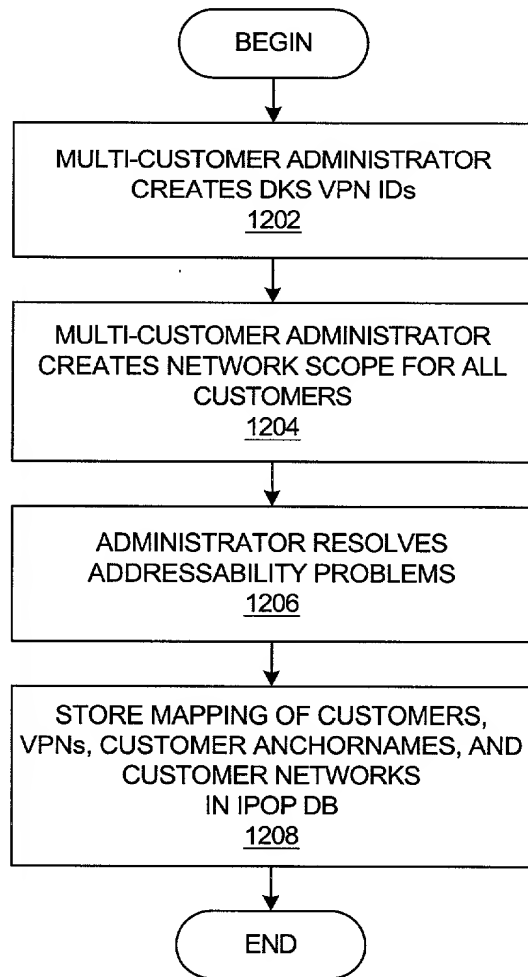


FIG. 12A

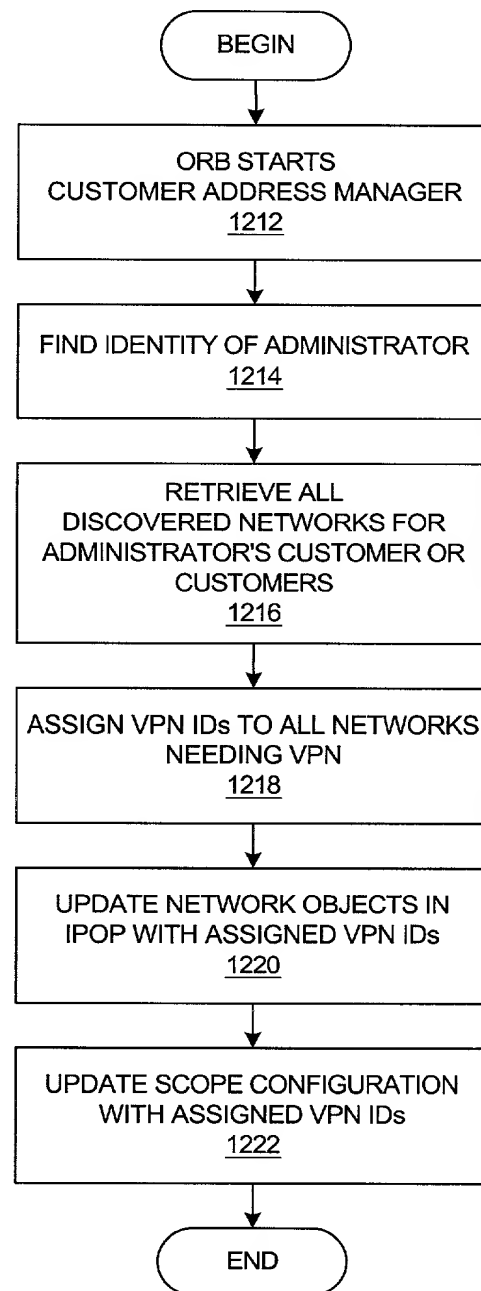


FIG. 12B

Method and system for presentation and specification of distributed multi-customer configuration management within a network management framework

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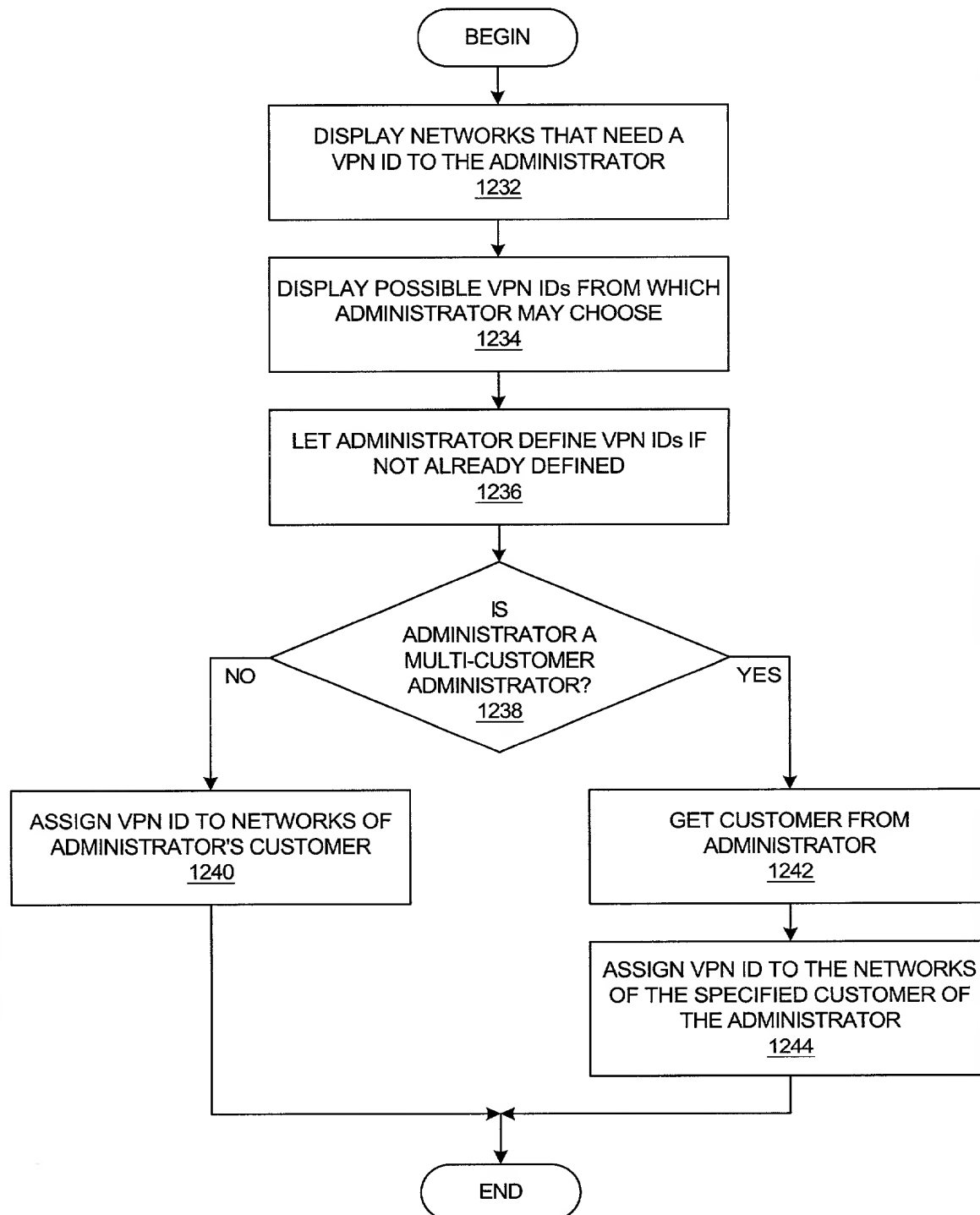
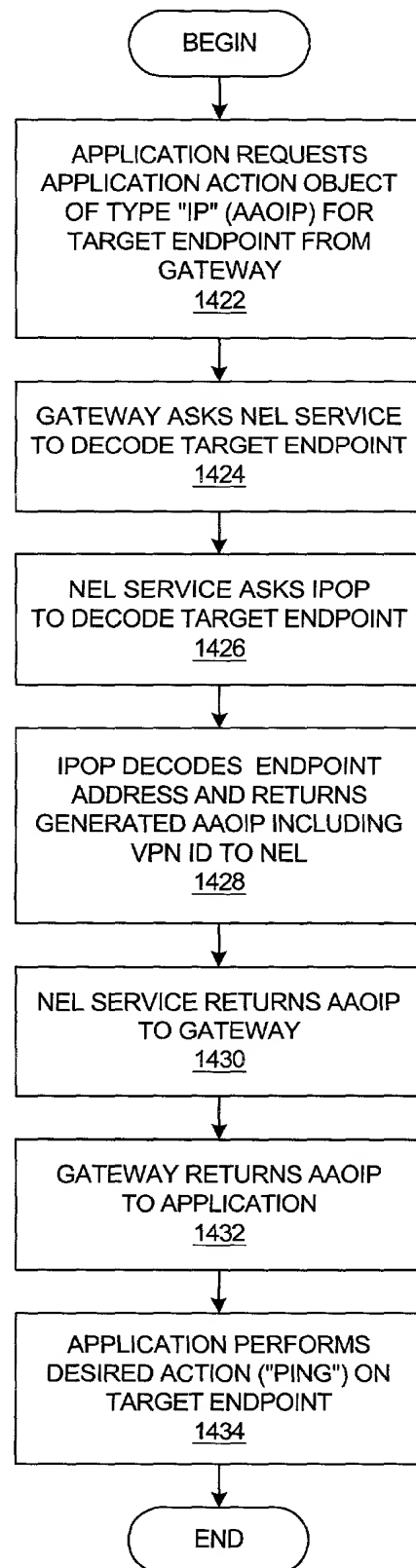
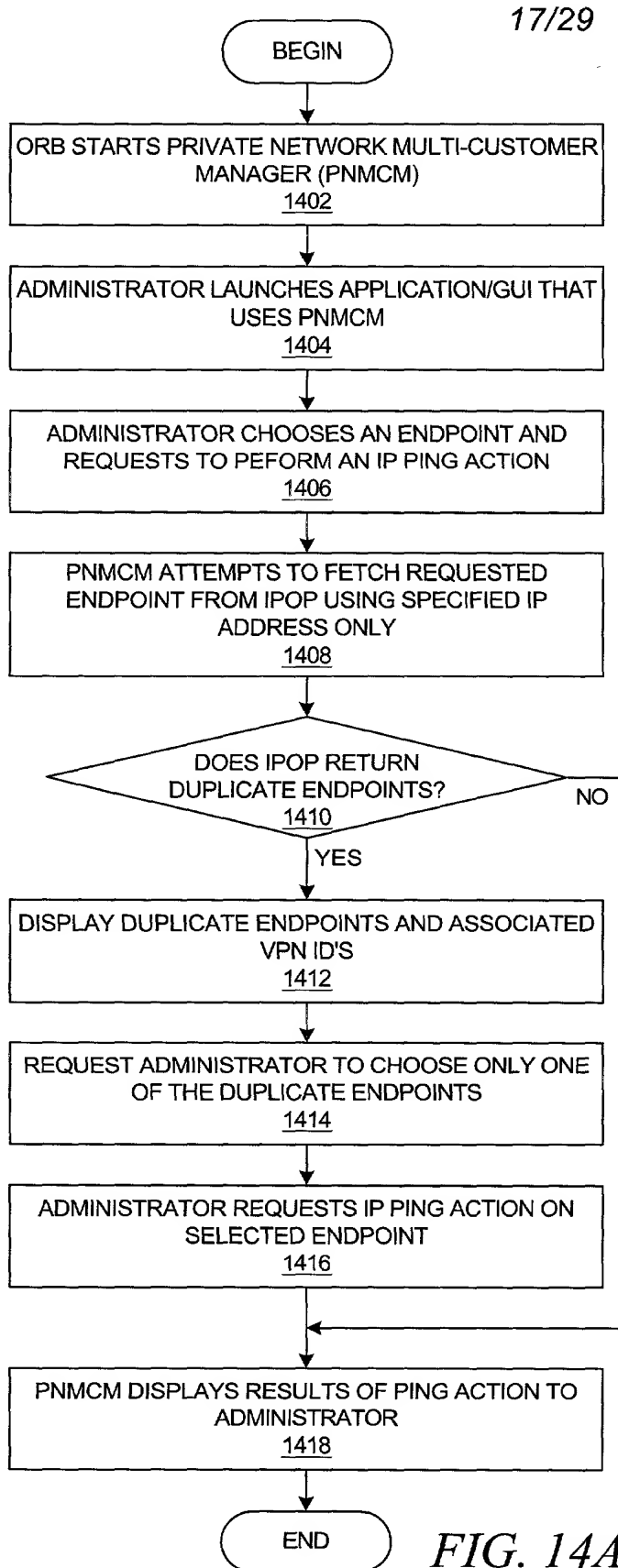


FIG. 12C

Method and system for presentation and specification of distributed multi-customer configuration management within a network management framework



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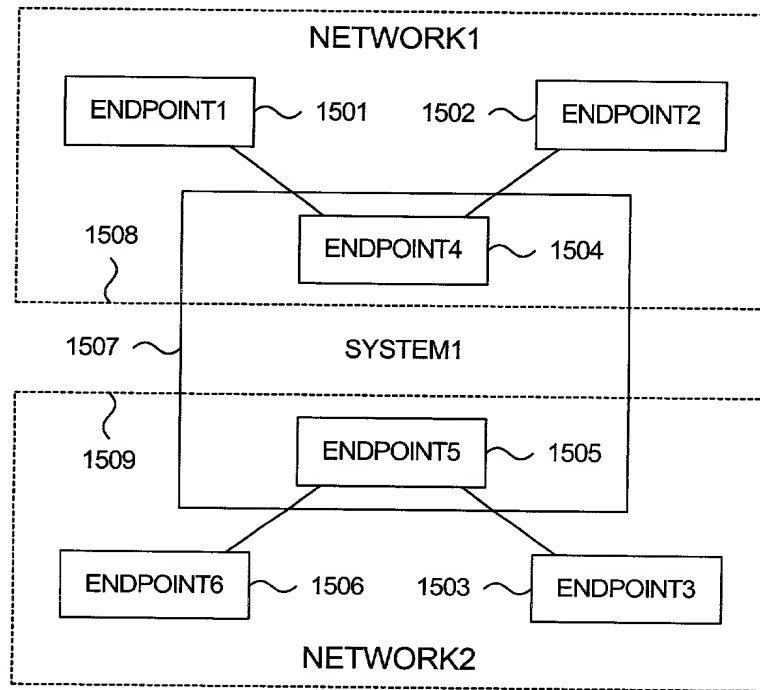
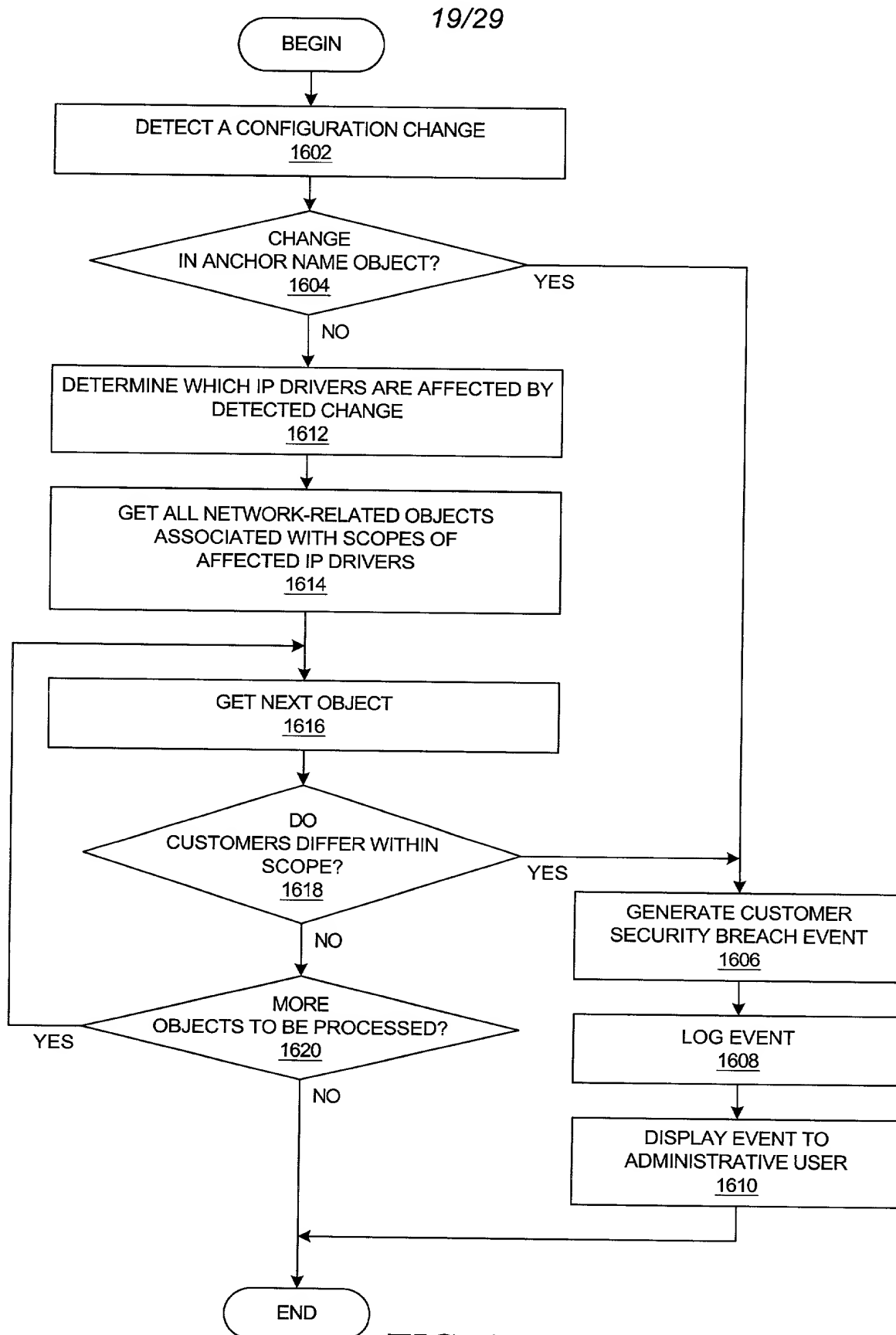


FIG. 15

FIG. 15

Method and system for presentation and specification of distributed multi-customer configuration management within a network management framework



Method and system for presentation and specification of distributed multi-customer configuration management within a network management framework

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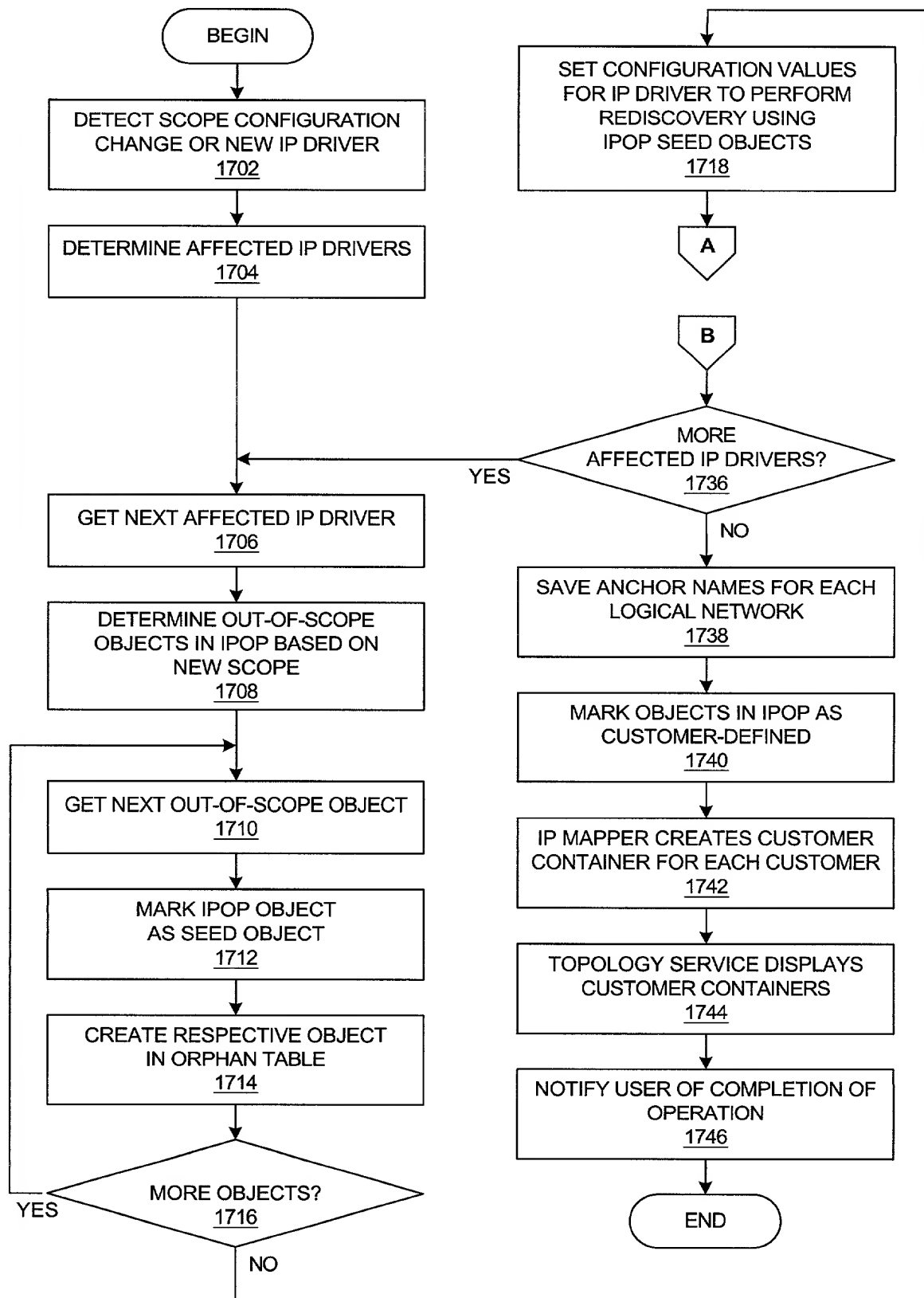


FIG. 17A

Method and system for presentation and specification of distributed multi-customer configuration management within a network management framework

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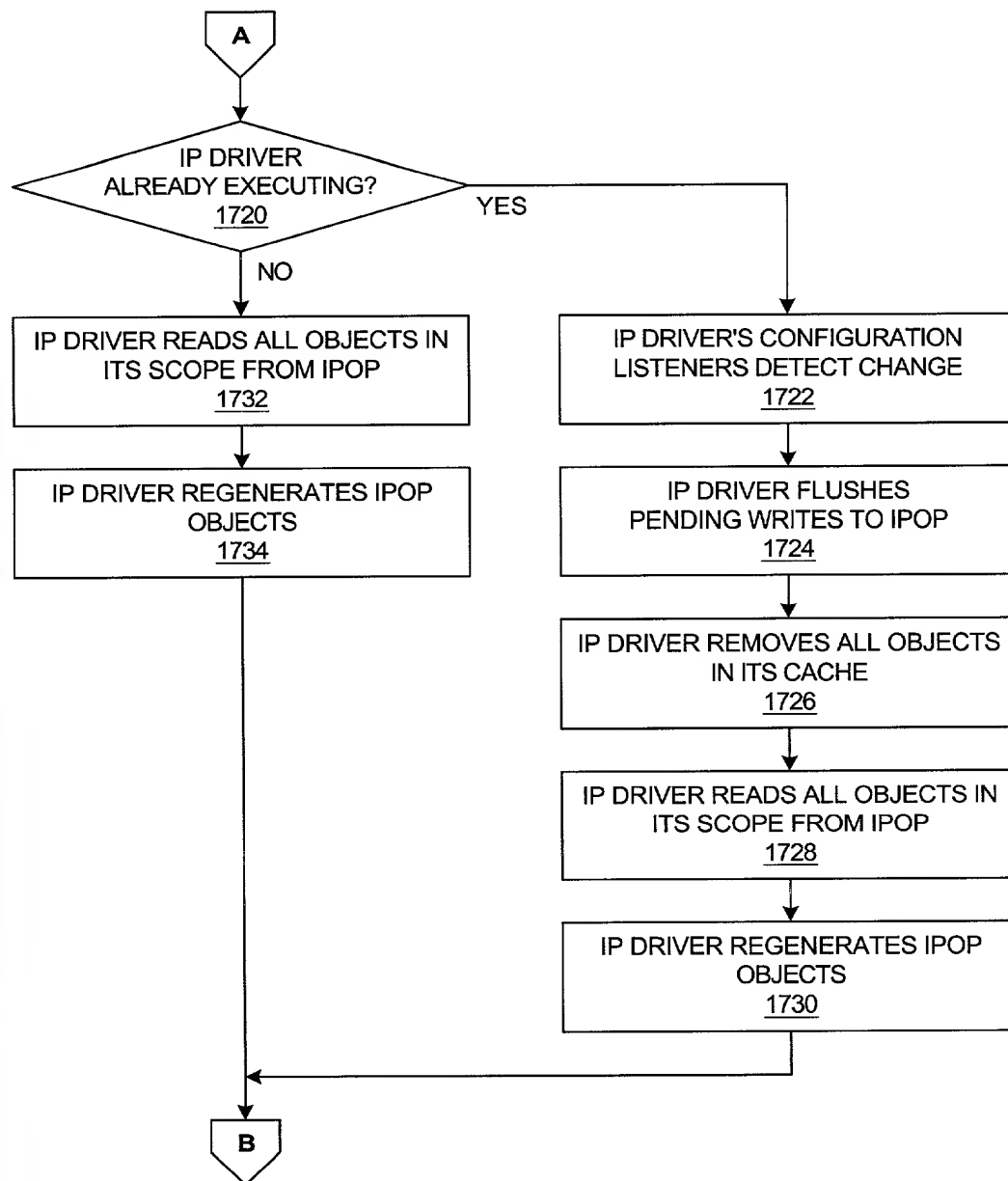


FIG. 17B

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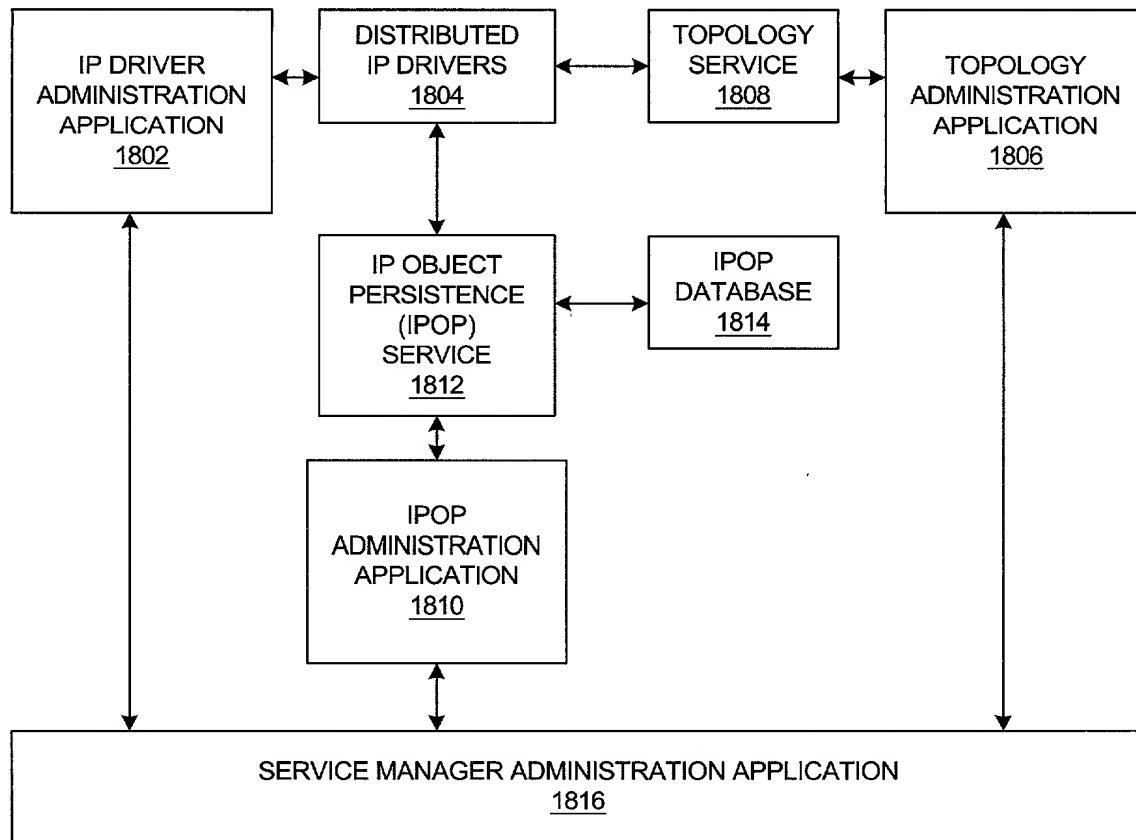


FIG. 18A

1820

1820

Service Manager Administration Application

SERVICE LOCATION MANAGEMENT

ORB ID

START IP DRIVER ON: 1822

START NEL ON: 1824

START GATEWAY ON: 1826

START TOPOLOGY ON: 1828

START IPOP ON: 1830

SET

CLEAR

FIG. 18B is a screenshot of a graphical user interface window titled "Service Manager Administration Application". Inside the window, there is a section titled "SERVICE LOCATION MANAGEMENT". Below this title, the text "ORB ID" is displayed. Five rows of input fields are provided, each preceded by a label: "START IP DRIVER ON:", "START NEL ON:", "START GATEWAY ON:", "START TOPOLOGY ON:", and "START IPOP ON:". To the right of each input field is a reference number: 1822, 1824, 1826, 1828, and 1830 respectively. To the right of the input fields, there are two buttons labeled "SET" and "CLEAR".

FIG. 18B

Method and system for presentation and specification of distributed multi-customer configuration management within a network management framework

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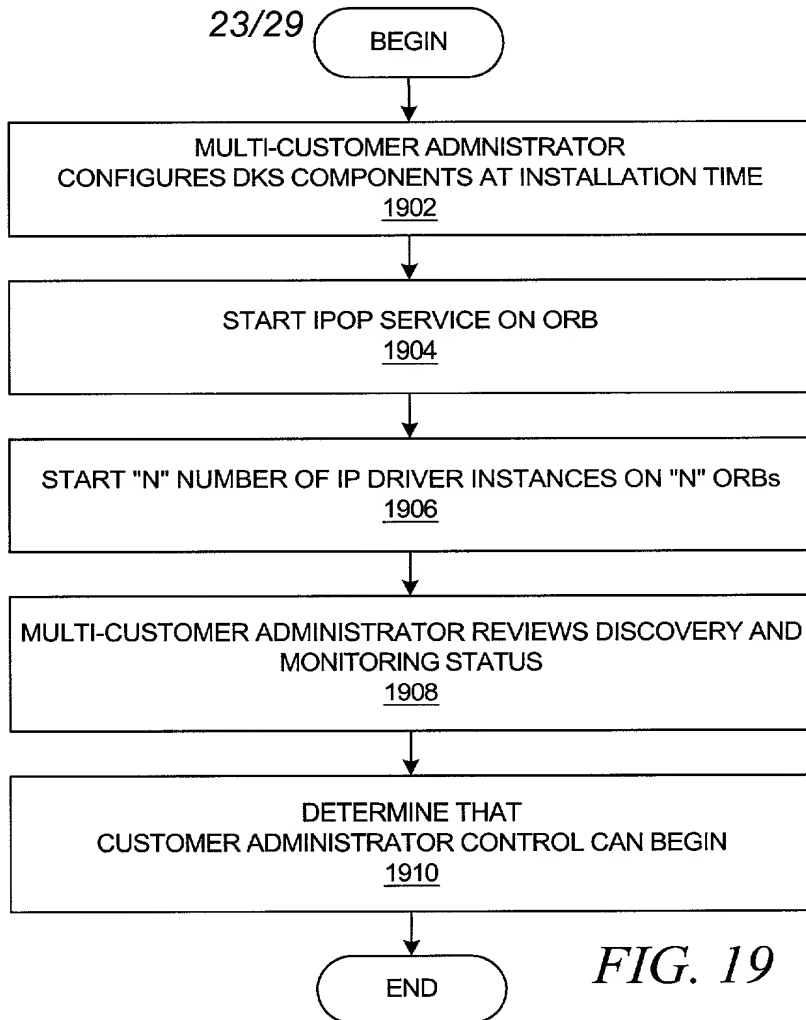


FIG. 19

2000

IPOP Administration Application

IPOP DATABASE POOL

ALLOW TYPES OF CONNECTIONS

☒ NATIVE DATABASE DB2 ~ 2002
☒ NATIVE DATABASE ORACLE ~ 2004
☒ GENERIC DATABASE ACCESS ~ 2006

URL OF DATABASES: ~ 2012

IPOP TOTAL NUMBER OF ENDPOINTS DISCOVERED: 28193 ~ 2014
IPOP TOTAL NUMBER OF IP DRIVERS: 5 ~ 2016

USERID: ~ 2008
PASSWORD: ~ 2010

CLEAR
SET

FIG. 20

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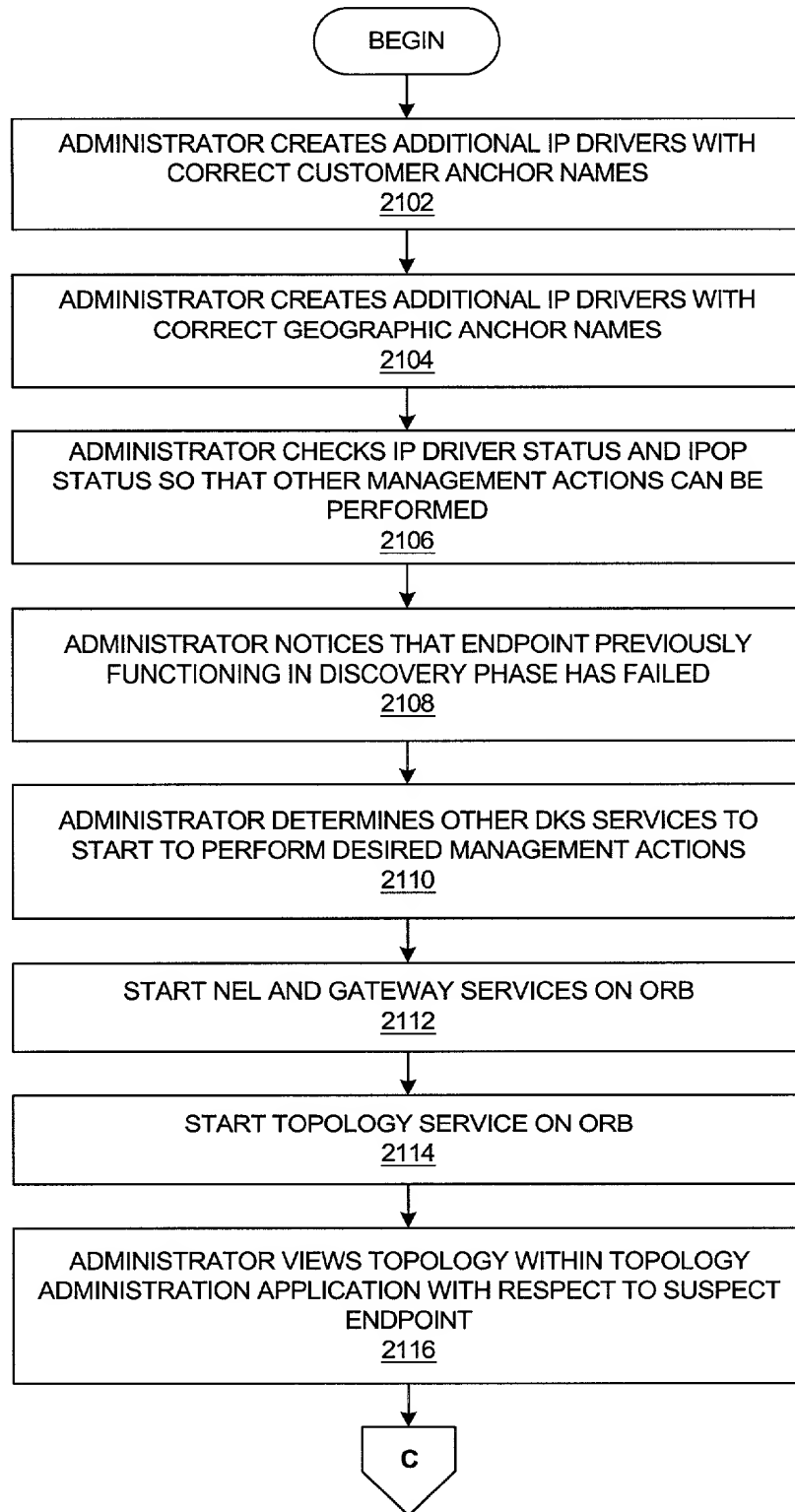
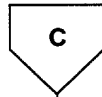


FIG. 21A

Method and system for presentation and specification of distributed multi-customer configuration management within a network management framework

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ADMINISTRATOR SELECTS SUSPECT ENDPOINT IN TOPOLOGY
ADMINISTRATION APPLICATION AND REQUESTS A
MANAGEMENT ACTION ON SUSPECT ENDPOINT
2118

TOPOLOGY ADMINISTRATION APPLICATION ASKS IP MAPPER
TO PERFORM MANAGEMENT ACTION ON SUSPECT ENDPOINT
2120

IP MAPPER REQUESTS AAO FOR REQUESTED MANAGEMENT
ACTION FROM NEL/GATEWAY SERVICES
2122

NEL GETS ROUTING INFORMATION
2124

NEL/GATEWAY SERVICES RETURN AAO TO IP MAPPER
2126

IP MAPPER USES AAO TO PERFORM MANAGEMENT ACTION
AND RETURN STATUS BACK TO TOPOLOGY ADMINISTRATION
APPLICATION
2128

TOPOLOGY ADMINISTRATION APPLICATION DISPLAYS RESULTS
OF REQUESTED MANAGEMENT ACTION TO ADMINISTRATOR
2130

END

FIG. 21B

TOP SECRET

Method and system for presentation and specification of distributed multi-customer configuration management within a network management framework

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THREAD CONFIGURATION POLICY

ENTER # THREADS PER IP DRIVER
DISCOVERY CONTROLLER:

ENTER # THREADS PER IP DRIVER
MONITOR CONTROLLER:

ADAPT # THREADS BASED ON LIFE
CYCLE OF DISCOVERY ENGINE:

General Properties Configuration Panel

General

Monitor ID 7

Number Of Polling Threads 24

OK Apply Undo Cancel

FIG. 22

← 2200

Scope Property Configuration Panel

Monitor Scope

Subnet	Mask	Priority	CustomerID	Private Network ID
146.84.28.0	255.255.255.0	0		
89.0.0.0	255.0.0.0	0		

OK Apply Undo Cancel

FIG. 23

← 2300

Discovery Mechanisms Configuration Panel

Discovery Mechanisms

X Enable ping spread discovery.
Poll the routing table of network systems.

X Poll the ARP table of network systems.
Enable unsolicited ping discovery.

Start discovery using these network addresses:
 Add/Delete

146.84.28.107

OK Apply Undo Cancel

FIG. 24

← 2400

105230-1936660

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. ARP Table Discovery Configuration Panel

ARP Table Discovery

Interval to poll ARP tables: 10h

Maximum number of ARP table entries to poll: 100

OK Apply Undo Cancel

FIG. 25

← 2500

Routing Table Discovery Configuration Panel

Routing Table Discovery

Interval to poll routing tables: 10h

Maximum number of routing table entries to poll: 100

☒ Discover unnumbered IP interfaces in routing tables.

OK Apply Undo Cancel

FIG. 26

← 2600

Ping Spread Discovery Configuration Panel

Ping Spread Discovery

Interval to initiate ping spread operations: 10h

Ping Spread Mask: 255.255.255.0

Interval between pings in milliseconds: 50ms

OK Apply Undo Cancel

FIG. 27

← 2700

4062390-43956360

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FIG. 28

. Node Configuration Panel

Node Information

☒ Use SNMP to poll system status.

Poll systems without SNMP agents

Delete nodes that have responded after 3d.

OK Apply Undo Cancel

← 2800

. DHCP Node Configuration Panel

DHCP Node Information

DHCP Address Ranges:

_____ Add/Delete

123.123.123.1-254

Delete DHCP nodes that have responded after 1d

OK Apply Undo Cancel

FIG. 29

← 2900

. Configuration Status Panel

Configuration Status, IP DRIVER 7

Monitor ID 7

Number of Polling Threads 24

Discovery Mechanisms

 ARP Table Discovery

 10h poll interval

 100 max entries

 Routing Table Discovery

 24h poll interval

 1000 max entries

Node Delete Interval 3d

DHCP Addresses 123.123.123.1-254

DHCP Node Delete Interval 1d

OK Apply Undo Cancel

FIG. 30

← 3000

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Thread Status Panel

Thread Status, IP DRIVER 7

Thread	Status	Task
265	idle	
266	running	ARP table poll - 123.123.67.3
267	idle	

OK Apply Undo Cancel

FIG. 31

← 3100

Task Status Panel

Task Status, IP DRIVER 7

Task	Status	Thread
ARP table poll - 146 84 28 107	scheduled	unassigned
ARP table poll - 123 123.67.3	running	319

OK Apply Undo Cancel

FIG. 32

← 3200

Navigation Panel

- General
- Scope
- Discovery
 - ARP Table
 - Routing Table
 - Ping Spread
- Nodes
- DHCP Nodes
- Status
 - Configuration
 - Threads
 - Tasks

FIG. 33

← 3300